

Amendment filed February 28, 2011

Reply to OA dated September 1, 2010

REMARKS

Claims 1-4, 6, 7 and 10-18 are pending, with claims 1-4 and 10-12 withdrawn from consideration. The present amendment amends claim 6. Upon entry of this amendment, claims 1-4, 6, 7 and 10-18 will be pending, with claims 1-4 and 10-12 withdrawn from consideration. Entry of this amendment and reconsideration of the rejections are respectfully requested.

No new matter has been introduced by this Amendment.

Interview Summary

Applicant's agent, Daniel Geselowitz, conducted a telephonic interview with Examiners Matthew Hoban and Melissa Koslow on February 15, 2011. Applicant thanks the Examiners for their courtesy during the interview.

In the interview, Applicant discussed a possible amendment requiring a surfactant adsorbed to the surface of the semiconductor ultrafine particles. The Barney reference was discussed, and the Examiners stated that paragraph [0029] of Barney suggested use of short chain polymers, which would be surfactants.

The Examiners agreed that Seddon does not disclose a surfactant adsorbed on the nanocrystals, but noted that Seddon was being cited for the use of the aminopropyl(trimethoxy)silane.

Claims 6, 13-18 are rejected under 35 U.S.C. §103(a) as being unpatentable over Barney in 2002/0110180 in view of Seddon in their publication entitled "CdSe Quantum Dot Doped Amine-Functionalized Ormosils." (Office action p. 3)

Claim 7 is rejected under 35 U.S.C. §103(a) as being unpatentable over Barney in 2002/0110180 in view of Seddon in their publication entitled “CdSe Quantum Dot Doped Amine-Functionalized Ormosils” as applied to claim 6 above, and further in view of Selvan in “Synthesis of tunable, highly luminescent QD-glasses through sol-gel processing.”
(Office action paragraph no. 4)

Reconsideration of these rejections is respectfully requested in view of the amendment to claim 6. Claim 6 has been amended to add the recitation: “wherein a surfactant selected from the group consisting of thioglycolic acid, thioglycerol and mercaptoethylamine is adsorbed to the surface of the semiconductor ultrafine particles.” Support for this amendment may be found in the specification, for example, at page 17, lines 15-23, and page 10, lines 20-21.

Barney discloses at [0029] that “the nanocrystal can be exposed to short chain polymers which exhibit an affinity for the surface.” However, there is no disclosure or suggestion in Barney for the use of thioglycolic acid, thioglycerol or mercaptoethylamine. Seddon does not disclose or suggest any surfactant adsorbed to the quantum dots.

Moreover, Applicant submits that the preparation methods of Seddon and Barney cannot achieve a high luminous efficiency.

Seddon forms glasses simply by adding semiconductor ultrafine particles to alkoxide and causing alkoxide to be hydrolyzed and dehydration-condensed. Barney does not describe a method for dispersing semiconductor ultrafine particles in the glass matrix.

On the other hand, in the present invention, semiconductor ultrafine particles are stabilized by dispersing the semiconductor ultrafine particles in an aqueous solution comprising a water-soluble compound containing a Group II element and a surfactant, as recited in the original

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Claim 3. Further, as recited in the original Claim 12, the prepared dispersion of the semiconductor ultrafine particles (comprising a water-soluble compound containing a Group II element and a surfactant) is added when the viscosity of the alkoxide reaches a certain value (300 to 3000 centipoises). Otherwise, a glass fluorescent material wherein the luminous efficiency is 20% or higher would not be obtained. Applicant here explains this in detail.

If the semiconductor ultrafine particles have defects on the surface thereof, the semiconductor ultrafine particles will lose the energy of the absorbed excitation light, and stop producing fluorescence. Simply adding semiconductor ultrafine particles to alkoxide as described by Seddon causes the ultrafine particles to be dissolved, resulting in numerous defects on the surface thereof. Consequently, the luminous efficiency of the semiconductor ultrafine particles will be significantly reduced.

To avoid this requires two techniques: dissolving components of the semiconductor ultrafine particles in alkoxide in advance; and adding the semiconductor ultrafine particles when the viscosity of the alkoxide increases along with the progress of the dehydration-condensation.

In this regard, Applicant refers to Li et al. (*Langmuir*, January 6, 2004, Vol. 20, no. 1, pp. 1-4), which is made of record in the concurrently filed Information Disclosure Statement. This document is nominally prior art under 35 U.S.C. 102(a). However, Applicant here perfects the claim for foreign priority of Japanese Application no. 2003-391685, filed November 21, 2003, which antedates the Li et al. (*Langmuir* 2004) document, with the attached verified translation of this priority application. Applicant submits that the present claims are fully supported by this priority document, and Li et al. is not prior art for the present claims.

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Applicant refers to the Experimental Section on page 2 of Li et al. (*Langmuir* 2004). The document states that the semiconductor ultrafine particles were added when the viscosity of the sol solution comprising a metal alkoxide reached 500 to 1500 mPa·s. The unit "mPa·s" used herein is equivalent to "centipoise." That is, a similar method as in the present invention was used in the above document.

A glass fluorescent material having a high luminous efficiency can be obtained only by this method. This method is neither disclosed nor suggested by Seddon, Barney or Selvan.

Accordingly, claims 6, 7, and 13-18 are not obvious over the cited references, taken separately or in combination.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact the applicants' undersigned agent at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

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In the event that this paper is not timely filed, the applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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Enclosures: Request for Continued Examination
Petition for Extension of Time
Verified Translation of Japanese Application No. 2003-391685